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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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INTEL/BLAKELY 12400 WILSHIRE BOULEVARD, SEVENTH FLOOR LOS ANGELES, CA 90025-1030			STRZELECKA, TERESA E	
			ART UNIT	PAPER NUMBER
			1637	

DATE MAILED: 08/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/067,029	Applicant(s) SUNDARARAJAN ET AL.	
	Examiner Teresa E. Strzelecka	Art Unit 1637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 18, 19, 21-23 and 33-45 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 18, 19, 21-23 and 33-45 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to an amendment filed May 18, 2006. Claims 18, 19 and 21-23 were previously pending. Applicants amended claim 18 and added new claims 32-45.
2. Claims 18,19, 21-23 and 32-45 will be examined.
3. Applicants' amendments overcame the rejection of claims 18, 19 and 21-23 under 35 U.S.C. 102(b) as anticipated by Hamon et al. All other rejections are maintained for reasons given in the Response to Arguments section below.
4. This office action contains new grounds for rejection necessitated by amendment.

Response to Arguments

5. Applicants' arguments filed May 18, 2006 have been fully considered but they are not persuasive.

Regarding the rejection of claims 18, 19 and 21-23 under 35 U.S.C. 102(b) as anticipated by Dai et al., Applicants argue that the term "suspendable in liquid" means "to keep insoluble particles more or less evenly dispersed throughout a fluid", and obtained from The AND Dictionary(?). However, as previously explained, Applicants did not define the term, and, since the device of Dai et al. is immersed in a liquid, and the carbon nanotubes are arranged on a substrate in an ordered fashion, they are certainly evenly distributed throughout the reaction liquid.

The rejection is maintained with the inclusion of claim 32.

Claim interpretation

5. Before proceeding with the rejections, interpretation of claim limitations is provided.

A) Modification of a friction coefficient of a nanotube is interpreted as resulting from changing the chemical composition of a nanotube. Any such chemical composition change will result in modification of a frictional coefficient, according to Applicants' definition of a

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frictional coefficient: “A friction coefficient, by definition, describes forces of interaction between at least two objects or surfaces. A friction coefficient can be described as including both an abrasive component, and an adhesive component. Abrasive friction is defined as primarily a mechanical interaction between two objects. In one example of abrasive friction, resistance to movement at an interface between two objects is generated by asperities on the surface of the objects rising past each other or breaking off. In contrast, adhesive friction is defined as primarily a chemical interaction between two objects. A friction coefficient may be determined either by abrasive factors, adhesive factors, or a combination of the two.”

(specification, page 2, lines 25-30; page 3, lines 1-3).

The limitations of increasing or decreasing a frictional coefficient of nanotubes refer to a measurement of a relative quantity, i.e., the same chemical modification of a nanotube measured against two different chemical surfaces may result in either decrease or increase in the friction coefficient.

Since any chemical modification changes friction coefficient of a nanotube, the steps of modifying a frictional coefficient of a nanotube and attaching the nanotube to a reactive molecule are interpreted as being the same step. Therefore, attaching a functional group to a nanotube will inherently either increase or decrease its frictional coefficient, depending against which substrate the frictional coefficient is measured.

Therefore, the limitation of increasing or decreasing the frictional coefficient of the nanotube does not add any additional structural limitations to the product claims.

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B) The terms "reactive molecule", "chemical modifier" and "assay molecule" were not defined by Applicants, therefore they are interpreted as any molecules. Consequently, the reactive molecule can be the same as the chemical modifier and the same as assay molecule.

C) The term "portion of the carbon nanotube" has not been defined, therefore, two different atoms of the nanotube are considered to be in two different portions.

D) The term "suspendable" has not been defined by Applicants, therefore it is interpreted as meaning capable of being suspended in a liquid. However, this term does not impart any structural limitation on the claimed product, as it refers to the manner of operating the device (see MPEP 2114):

APPARATUS CLAIMS MUST BE STRUCTURALLY DISTINGUISHABLE FROM THE PRIOR ART

>While features of an apparatus may be recited either structurally or functionally, claims< directed to >an< apparatus must be distinguished from the prior art in terms of structure rather than function. >*In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997) (The absence of a disclosure in a prior art reference relating to function did not defeat the Board's finding of anticipation of claimed apparatus because the limitations at issue were found to be inherent in the prior art reference); see also *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 228-29 (CCPA 1971);< *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). "[A]pparatus claims cover what a device *is*, not what a device *does*." *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990) (emphasis in original).

MANNER OF OPERATING THE DEVICE DOES NOT DIFFERENTIATE APPARATUS CLAIM FROM THE PRIOR ART

A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987) (The preamble of claim 1 recited that the apparatus was "for mixing flowing developer material" and the body of the claim recited "means for mixing ..., said mixing means being stationary and completely submerged in the developer material". The claim was rejected over a reference which taught all the

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structural limitations of the claim for the intended use of mixing flowing developer. However, the mixer was only partially submerged in the developer material. The Board held that the amount of submersion is immaterial to the structure of the mixer and thus the claim was properly rejected.).

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 18, 19, 21-23 and 32 are rejected under 35 U.S.C. 102(e) as being anticipated by Dai et al. (U.S. Patent No. 6,528,020 B1; cited in the previous office action).

Regarding claim 18, Dai et al. teach a molecular identification assembly comprising:

a reactive molecule (Dai et al. teach a nanotube device comprising electrodes, therefore, they teach reactive molecules which constitute the electrodes. The electrodes can be nickel-gold or titanium-gold, therefore the reactive molecules are gold, zinc and titanium (col. 2, lines 17-20; col. 4, lines 29-32).)

a carbon nanotube attached to the reactive molecule (Dai et al. teach a nanotube device comprising electrodes deposited on both ends of a carbon nanotube (col. 2, lines 15-20; col. 4, lines 23-34).); and

a chemical modifier attached to a portion of the carbon nanotube separate from the reactive molecule, the chemical modifier altering the friction coefficient of the carbon nanotube

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(Dai et al. teach modifying the nanotube by coating or decorating it with one or more sensing agents (= chemical modifiers), such as metal particles, polymers and biological species. In particular, Dai et al. teach deposition of gold onto the nanotube and attachment of thiol groups to gold. Thiol is modified with carboxylic functional group (col. 2, lines 28-32; col. 5, lines 32-43 and 51-63; Fig. 5 and 7A). Therefore, since Dai et al. teach attachment of molecules to the nanotube, they teach attachment of chemical modifiers, which inherently change the friction coefficient of the nanotube.);

wherein the molecular identification assembly is suspendable in a liquid (Dai et al. teach binding of avidin in solution to carbon nanotubes derivatized with thiol molecules by operating the device in liquid (col. 5, lines 51-63). Therefore, Dai et al. inherently teach suspendable molecular assembly.

Regarding claim 19, Dai et al. teach an assay molecule, since they teach gold, zinc or titanium electrodes, therefore they teach molecules of gold, titanium and zinc (col. 2, lines 17-20; col. 4, lines 29-32). Since Applicants did not define the term “assay molecule”, these molecules are considered to be assay molecules.

Regarding claim 21, Dai et al. teach thiol molecules (= chemical modifier) with carboxylic functional groups (col. 5, lines 51-63).

Regarding claims 22 and 23, Dai et al. teach attachment of chemical modifiers to the nanotube, therefore, as explained in the “Claim Interpretation” section, they inherently teach increasing or decreasing the frictional coefficient of the nanotubes.

Regarding claim 32, Dai et al. teach carbon nanotubes with an exterior surface containing chemical modifiers attached to different locations on the surface (col. 2, lines 11-31).

8. Claims 18, 19, 21-23 and 32-45 are rejected under 35 U.S.C. 102(e) as being anticipated by Hannah (U.S. Patent No. 6,821,730).

Claims 39 and 18 will be considered together in claim 39.

Regarding claims 18 and 39, Hannah teaches a molecular assembly comprising:

a reactive molecule capable of detecting the presence of DNA sequence in a sample through hybridization to the DNA sequence (Hannah teaches DNA probes capable of detecting DNA sequence through hybridization (col. 10, lines 60-64; col. 12, lines 46-62).);

a fullerene molecule attached to the reactive molecule (Hannah teaches carbon nanotubes attached to the DNA probe (Abstract; col. 2, lines 55-65; col. 6, lines 61-67; col. 7, lines 1-19; col. 12, lines 29-38).); and

wherein the fullerene molecule has a plurality of chemical modifiers attached to a portion of the fullerene molecule separate from the site which the reactive molecule attaches to the fullerene molecule, the chemical modifiers altering the friction coefficient of the fullerene molecule (Hannah teaches derivatization of nanotubes with carboxylic acid groups (col. 6, lines 44-60). Since not all of these groups are used to attach to the DNA probe, Hannah teaches chemical modifiers altering the friction coefficient of the carbon nanotube, the chemical modifiers being different from the reactive molecule).).

Regarding claims 33 and 41, Hannah teaches multiple carbon nanotubes attached to the probes (col. 5, lines 52-61).

Regarding claim 18, the DNA probes are suspendable in liquid (col. 12, lines 46-62).

Regarding claim 19, Hannah teaches DNA probes (col. 10, lines 60-64), therefore they teach assay molecules.

Regarding claim 21, Hannah teaches carboxylic acid groups (col. 6, lines 51-57).

Regarding claims, 22, 23, 35, 36, 43 and 44, Hannah teaches attachment of chemical modifiers to the carbon nanotubes (col. 6, lines 44-6), therefore, as explained in the "Claim

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Interpretation” section, they inherently teach increasing or decreasing the frictional coefficient of the nanotubes.

Regarding claims 32 and 38, Hannah teaches carbon nanotubes with external surfaces with a plurality of chemical modifiers attached to the exterior surface (col. 1, lines 18-25; col. 6, lines 44-60).

Regarding claims 34 and 40, Hannah teaches chemical modifiers which are carboxylic acid groups (col. 6, lines 44-60), which are chemically distinct from DNA probes (= reactive molecules).

Regarding claims 37 and 42, Hannah teaches carbon nanotubes (col. 1, lines 18-25).

Regarding claim 45, Hannah teaches multiple carbon nanotube labels attached to the probes (col. 5, lines 52-61), and libraries of multiple nucleic acid probes (col. 7, lines 20-26).

9. No claims are allowed.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Teresa E. Strzelecka whose telephone number is (571) 272-0789. The examiner can normally be reached on M-F (8:30-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion can be reached on (571) 272-0782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Teresa E Strzelecka
Primary Examiner
Art Unit 1637

Teresa Strzelecka

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